Facilities, Equipment and Other Resources

A. Research and Support Facilities at Northern New Mexico College, Espanola, NM

At Northern, the main facility for research and data collection for the EDUCERE project is the brand new, state-of-the-art Solar Energy Research Park and Academy (SERPA) building. SERPA which, also hosts the College of Engineering and Technology (CET), is equipped with modern facilities and laboratories specifically designed for undergraduate use.

1. Mechanical Engineering Laboratory - Location: SERPA Building, Room 114. This laboratory is dedicated for undergraduate learning and research and houses basic instrumentation for use in applied mechanics, structures, thermal-fluids engineering research. This lab is equipped with an e-Instruction smart board. This facility is under the direction of engineering faculty. Equipment and Resources available for research in this lab include:

- Mechanics System (Measurement of forces and torque, equilibrium of physical body, friction, simple harmonic motion etc.)
- Structure set (Analysis for trusses , frames, machine components)
- Sensors: force sensors, motion sensors (linear and rotational), temperature and pressure sensors
- Materials Stress-Strain Apparatus
- Shear Force Bending Moment Apparatus
- Heat Engine/ Gas Law Apparatus
- Heat Pump Apparatus
- Adiabatic Gas Law Apparatus
- Thermal Conduction Apparatus
- Thermal Expansion Apparatus
- Thermal Radiation Cube
- Venturi Apparatus
- Heat Exchangers
- Fuel Cell-Electrolyzer unit
- Conservation of Energy
- Blackbody Radiation
- PASCO 850 Universal Interface- a comprehensive interface for data acquisition and signal generation
- PASCO Capstone^{TM} Software for automated data acquisition and analysis.
- Basic Hydraulics Bench
- Flow Visualization of Streamlines
- Methods of Flow Measurements
- Lego Mindstorm Robotics Kits

2. Solar Energy Laboratory - Location: SERPA Building, Room 114. This laboratory is used for undergraduate learning and research in the areas of renewable energy and solar energy. Major equipment items in this lab include:

- Solar Thermal Training module- LabVolt
- Solar Photovoltaics Training module- Lucas Nuvell
- Pyranometer, Pyrhelieometer, Eppley Precision Spectral Pyranometer (PSP)
- Vernier Energy sensor, load sensor and Vernier Labquest 2 data loggers
- Uni-Train 1 Photovoltaic Course- Lucas Nuvell
- Transparent solar Sterling dish generator
- Dual axis smart PV trackers
- Solar Oven
- Water distiller
- Parabolic/paraboloid sun tracker
- Flat plate solar thermal collector

3. Machine Shop - Location: High Tech (HT) Building, Room 117. This machine shop is used for machining and fabrication purposes for student class projects and capstone projects. Major machine tools in this lab include:

- Bridgeport Milling Machine
- Lathe
- Two CNC machines
- 3-D Printer
- Bandsaw machine
- Drilling machine
- Grinding machine

4. Design and Drafting Laboratory – Location: HT Building, Room 119. This laboratory, equipped with 20 PC desktops, is dedicated for engineering design and drafting purposes. Currently, engineering students have access to the SolidWorks and AutoCAD software.

5. Computer Programming Laboratory – Location: HT Building, Room 123. The Lab has 22 PC desktop computers with Linux and Windows Operating systems as well as open source IDE's for C and Java languages. MySQL DBMS is also available in this lab. The lab is equipped with an e-Instruction smart board. It also has a rack with networking equipment.

6. Instrumentation Laboratory – Location: SERPA Building, Room 115. This lab has 12 desktop PC computers, material for instrumentation (National Instruments ELVIS II equipment and other electronic components), and Xilinx Nexis II (SPARTAN 3) FPGA equipment. The Instrumentation Lab is utilized for Electrical Systems and Controls classes. The ELVIS II equipment has an integrated suite of twelve instruments (including oscilloscopes, power supplies, breadboards, multimeters, and function generators). This equipment is connected to desktop PC computers available in the lab and can be integrated to LabVIEW. The lab is equipped with an e-Instruction smart board.

7. <u>Peer Tutoring and Learning Center</u> - Location: SERPA Building, Room 117. This Center staff's student tutors who provide tutoring and other support services to all engineering students and provides basic study furniture and equipment, including:

- 7 Dell Optiplex desktop computers equipped Windows 7 and with necessary software (MS Office, Internet Browsers, PDF viewer, LabVIEW, MATLAB).
- Copier/ Printers for student use
- Desks, tables and whiteboards.

8. <u>Student Lounge and Study Area</u>: Location: SERPA Building: Lobby and Outdoor Patio. This modern and comfortable student lounge and outdoor patio provides a place for students to study, eat and relax without having to leave the engineering learning center.

9. <u>Computer Support</u>: Location: Northern's IT Department and Student Support Services. A variety of environments with computer support and wireless connectivity, as well as other services that include access to email and protected data storage exist within the SERPA building, and throughout the campus. Northern's IT and Marketing Departments also launched a new and enhanced website.

10. <u>Administrative/Professional Assistance</u>: Northern's College of Engineering and Technology provides administrative and technical assistance that aids with purchasing, accounting, human resource management, and scheduling of facility and faculty resources. In addition, Northern's Office of Advancement assists with both pre- and post-award accounting and grant management services and effectively interfaces between programs and the College's Business Office personnel to ensure compliance and monitoring of institutional and grant funds.

11. <u>Student Computer Support</u>: Location: The Student Success Center, located in the main general education building, houses a 50-computer laboratory and an instructional area with 20 additional computers for use by all students. The SSC also has rooms for individual and group tutoring, and staffs professional and student tutors in STEM and writing.

B. Educational Environment on the Northern Espanola Campus

Northern New Mexico College hosts a full campus with state-of-the art computer and laboratory facilities for classroom instruction, a fully-equipped Student Support Services Center, which includes a computer lab, professional tutorial assistance, study groups, student mentors, other critical testing services, and a brand new library facility with large meeting spaces and individual and collective study areas. Spacious and light-filled, the library is already proving to be a magnet for students to gather and study, for faculty to meet in one of several conference rooms, and for a variety of campus-wide activities, including Phoneathons, Research Symposia, specialized exhibits, musical performances, poetry and book readings, and other educational exhibits. Northern also has an open and spacious student union with a student game room and study lounge, and recently renovated the Advising wing and Bookstore.

Moreover, Northern has a new Fine Arts building and a very adequate Recreation Center with basketball courts, a weight and cardio room, racquetball courts and a sauna. Much effort is

placed in providing students with recreational and communal opportunities to engage in campus life. Myriad student organizations and support groups, as well as programs in Dance, Fiber Arts, Film, Flamenco, Jazz and Rock Music, and Theatre are provided through traditional and non-traditional programs.

The college also hosts an American Indian Center, which now includes the American Indian Affairs Office, Northern Pueblos Institute and Pueblo Indian Studies. A Small Business Development Center (SBDC) provides small business assistance with business planning, marketing, business financing, small business start up, entrepreneurial training, and other specialized areas to help grow and strengthen businesses in New Mexico. The SBDC is a partnership of the U.S. Small Business Administration, the State of New Mexico, the New Mexico Association of Community Colleges, and the private sector.

Many students arrive at Northern with math and writing deficiencies and require extensive remediation and support. Through Title V grant funding, the College also hosts a:

- Math Tutoring Center – Housed in the new and state-of-the-art High Tech building, the Math Center provides tutoring for all levels of math to all students, free of charge.

- Writing Center – Housed in the main General Education Building, The Writing Center provides comprehensive tutoring and writing support to all students, free of charge.

- On-site Counseling Services are available to students who wish to speak to a professional counselor about personal, work and school related issues, free of charge.

In addition to these and other specific departmental resources, such as the Engineering Tutoring Center, Northern also provides a number of free and specialized college-wide services, including the Accessibility Resource Center, Veterans Resource Center, American Indian Center, Office of Diversity and Equity, Educational Opportunity Center, and a Career Advising Center.

Northern's fundamental mission is to provide accessible, affordable, community-based, quality learning opportunities for the educational, economic and societal needs of the region. This mission is achieved by providing a high quality undergraduate education that emphasizes comprehensive and relevant knowledge and transferable skills in preparation for professional careers. Northern is recognized as both a Hispanic and Native American Serving Institution as defined by Title V of the U.S. Department of Education.

Finally, a state chapter of the Society for the Advancement of Chicanos and Native Americans in Science (SACNAS), one of only two in the state of New Mexico, has been established at Northern. This and myriad other student organizations in every department exist to strengthen community among students and to provide leadership and other important training. In recent years, Northern's efforts to strengthen its STEM programs has been supported with funding from the National Science Foundation, the Department of Education's Title III and Title V, CCRAA funding, and funding from the Los Alamos National Security (LANS) Community Outreach investment.

C. Collaborations that Support Workforce Development and Summer Undergraduate Research Experiences, as well as Graduate School Partnerships:

Northern's College of Engineering (CET) and Technology has collaborations with local industry to provide Electromechanical Engineering Technology majors with summer internships that will foster their professional and career development, and present them with choices and options for future careers. In addition, the CET also has special ties with Mechanical Engineering Departments at colleges and universities in New Mexico in which Northern students will be considered for support in graduate programs. A few of the collaborating institutions include:

- Los Alamos National Laboratory, National Security Education Center - Student Programs
- Los Alamos National Laboratory, Center for Integrated Nanotechnologies, Materials, Applications and Physics
- Los Alamos National Laboratory, Science and Technology Base Programs/Education and Postdoc Office
- Biohabitats, Southwest Basin and Range Bioregion – A conservation planning, ecological restoration and regenerative design firm with regional offices in Santa Fe, NM and Denver, CO
- National Renewable Energy Laboratory – Summer, hands-on internship experiences in the fields of renewable energy and energy efficiency
- New Mexico Institute of Mining and Technology - Mechanical Engineering Department: Master of Science Degree program
- New Mexico State University – College of Engineering: Master of Science in Mechanical Engineering and Doctor of Philosophy in Engineering

D. Research Oversight, Compliance and Safety

Northern maintains a commitment to the highest standards of integrity in all aspects of its educational mission. This includes adherence to standards of ethics in all areas of teaching, research and mentoring activities undertaken by its faculty, staff and students. Northern maintains compliance with federal, state, and institutional regulations and policies. The Office of Institutional Advancement, administration, and faculty leaders provide oversight over the responsible conduct of research and ensure conformity with regulatory requirements relating to research, including humane treatment of human and animal subjects and safety in the use of recombinant DNA and hazardous agents. Towards this end Northern maintains an Institutional Review Board (IRB), which reviews all proposals that require any aspect of human surveys or sampling. All units within the College interface with the institution's safety and security committee to assure adherence to OSHA and other safety processes, protocols and practices, including providing requisite training and related educational programs for all employees.

Data Management and Sharing of Research Plan

Types of data collected: The following data will be collected through the course of the EDUCERE Program and after the program funding period is completed:

- Student participant academic and persistence data
- Student participant assessments of learning gains
- Student participant pre- and post- research experience assessment surveys; compilation of success stories
- Samples of student's research projects (science posters, video/recordings of lectures, copies of abstracts and journal articles)
- Student participant retention and graduation data
- Student participant career tracking data
- Faculty and Peer-led Team Mentor surveys
- Baseline and post-project data on outreach, recruitment, and enrollment in engineering

Data Standards: Data Standards: Text data will be saved as MS Word files and pdf documents; tabular data will be saved as Excel spreadsheets or data tables; and photos will be saved as .jpg files. Raw data will be entered into SPSS as data files and aggregate data will be included in reports. Statistical analyses will be performed to include: correlations, regression equations, alpha coefficients, and T-tests, as appropriate.

Policies for Access and Data Sharing: Student participant data will be shared between the EDUCERE PI and Co-PI's who will maintain electronic copies.

Dr. Marquez will have access to raw participant survey data, which will be coded so that participants can be tracked. Confidentiality procedures will be observed. Data will be stored encrypted on a password-protected computer. Only aggregate data will be provided to the Steering Committee. All retention, graduation and career data, as well as participant demographics, academic progress, etc., will be stored encrypted on password-protected computers belonging to the PI and Co-PI ████████████

Samples of student research, photos and stories collected will be posted on Northern's website, with written permission from the participants. The PI will be responsive to requests for data from researchers and the public. IRB protocols will be followed with respect to data collection, accessibility, confidentiality, informed consent procedures, and anonymity of human subjects. Psychology students supporting Dr. Marquez in the research will all obtain NIH Human Subjects Rights ethics certificates.

Policies for Re-Use, Redistribution: Northern will apply for and employ a Creative Commons CC BY license to allow for greater sharing of reports and information.

Plans for Archiving & Preservation: This Program will not require special long-term storage facilities other than Northern's web-server. Summary data will be available on Northern's

website for two years after the project end-date, stored for seven years in the Northern data storage system, and archived in the Northern library archival system thereafter.

Other policies related to confidential information include the following:
- No personal student information (including name, email, address, phone or student ID) will become available to the public, except in cases where materials are published and informed consent has been obtained.
- All informed consent protocols and confidentiality procedures will be observed.
- Personal student information in electronic form will be stored and backed up in encrypted files in local (Espanola Campus), secure hard drives with no access to the public. Paper materials from students will remain stored in the Biology Department Archives.

Additionally, final reports will be made available through potential publications in the American Sociological Association, the National Social Science Association, the Best Practices Conference of the Alliance for Hispanic Serving Institute Educators, Society for Advancement of Chicano and Native American Students, or the Hispanic Association of Colleges and Universities, summarizing data on demographics of students in the project, academic progress and retention statistics for the group for the particular year, along with descriptions of mentoring practices. Summary data will also be made available on the Northern website EDUCERE page.